

ABSTRACT

Hard metal particles having hardness which is lower than the hardness of a nitrided outermost layer of a spring and in the range of Hv 500 to 800 and a diameter of 500 to 900 μm are projected against the nitrided surface of the spring at a velocity of 40 to 90 m/sec to prevent generation of a microcrack in the surface layer and provide a compression residual stress comparatively deep inside the spring. Against the resultant spring surface, a number of fine metal particles having a mean diameter of all particles of 80 μm or less, a mean diameter of each particle in the range between 10 μm inclusive and less than 100 μm , a spherical or near spherical shape with no square portions, a specific gravity of 7.0 to 9.0, and hardness which falls in the range between Hv 600 and Hv 1100 inclusive and is equal to or less than the hardness of the outermost surface layer of the spring after nitriding, at a velocity of 50 to 190 m/sec., while controlling temperature to be low enough to cause work hardening but not to cause softening due to recovery/recrystallization, to provide a high compression residual stress in a near surface layer without generation of microcracks in the surface layer and thus obtain a valve spring and the like excellent in fatigue strength.